

Claims:

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1. A method of embedding a digital watermark in digital audio data coded using a synthesiser-architecture format, said method including the steps of:
embedding at least a portion of said digital watermark in sample data and articulation parameters of said synthesiser-architecture format.
2. The method according to claim 1, further including the step of adaptively coding said digital watermark in said sample data.
3. The method according to claim 2, wherein redundancy adaptive coding is used based on a finite automaton.
4. The method according to claim 1, further including the step of hiding said digital watermark in said articulation parameters by creating virtual parameters.
5. The method according to claim 4, further including the step of embedding said digital watermark in said virtual parameters.
6. The method according to claim 4 ~~or 5~~, further including the step of extracting one or more coded bits from watermarked sample data, said virtual parameters created dependent upon a watermarked coded bit sequence.
7. The method according to claim 6, further including the step of hiding said watermarked coded bit sequence in said articulation parameters.
8. The method according to claim 7, further including the step of embedding said watermarked coded bit sequence in said virtual parameters.
9. The method according to claim 7 ~~or 8~~, further including the step of encrypting said digital watermarked coded bit sequence.

10. The method according to claim 4 ~~or 5~~, further including the step of encrypting said digital watermark.

11. The method according to ^{claim 1} ~~any one of claims 1 to 10~~, further including the step of generating said digital watermark.

12. The method according to ^{claim 1} ~~any one of claims 1 to 11~~, further including the step of dividing said digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

13. The method according to ^{claim 1} ~~any one of claims 1 to 12~~, further including the step of embedding a playback-control signal.

14. The method according to ^{claim 1} ~~any one of claims 1 to 13~~, wherein said digital audio data coded using a synthesiser-architecture format is wavetable (WT) audio.

15. An apparatus for embedding a digital watermark in digital audio data coded using a synthesiser-architecture format, said apparatus including:

means for embedding at least a portion of said digital watermark in sample data of said synthesiser-architecture format; and

means for embedding at least a portion of said digital watermark in articulation parameters of said synthesiser-architecture format.

16. The apparatus according to claim 15, further including means for adaptively coding said digital watermark in said sample data.

17. The apparatus according to claim 16, wherein redundancy adaptive coding is used based on a finite automaton.

18. The apparatus according to claim 15, further including means for hiding said digital watermark in said articulation parameters by creating virtual parameters.

5 19. The apparatus according to claim 18, further including means for embedding said digital watermark in said virtual parameters.

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10 20. The apparatus according to claim 18 ~~or 19~~, further including means for extracting one or more coded bits from watermarked sample data, said virtual parameters created dependent upon a watermarked coded bit sequence.

21. The apparatus according to claim 20, further including means for hiding said watermarked coded bit sequence in said articulation parameters.

15 22. The apparatus according to claim 21, further including means for embedding said watermarked coded bit sequence in said virtual parameters.

20 23. The apparatus according to claim 21 ~~or 22~~, further including means for encrypting said digital watermarked coded bit sequence.

24. The apparatus according to claim 18 ~~or 19~~, further including means for encrypting said digital watermark.

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25 25. The apparatus according to ^{claim 15} ~~any one of claims 15 to 24~~, further including means for generating said digital watermark.

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26. The apparatus according to ^{claim 15} ~~any one of claims 15 to 25~~, further including means for dividing said digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

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27. The apparatus according to ^{claim 15} ~~any one of claims 15 to 26~~, further including means for embedding a playback-control signal.

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28. The apparatus according to ^{claim 15} ~~any one of claims 15 to 27~~, wherein said digital audio data coded using a synthesiser-architecture format is wavetable (WT) audio.

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29. A computer program product having a computer readable medium having a computer program recorded therein for embedding a digital watermark in digital audio data coded using a synthesiser-architecture format, said computer program product including:

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10 means for embedding at least a portion of said digital watermark in sample data of said synthesiser-architecture format; and

means for embedding at least a portion of said digital watermark in articulation parameters of said synthesiser-architecture format.

15 30. The computer program product according to claim 29, further including means for adaptive coding said digital watermark in said sample data.

20 31. The computer program product according to claim 30, wherein said redundancy adaptive coding is used based on a finite automaton.

32. The computer program product according to claim 29, further including means for hiding said digital watermark in said articulation parameters by creating virtual parameters.

25 33. The computer program product according to claim 32, further including means for embedding said digital watermark in said virtual parameters.

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30 34. The computer program product according to claim 32 ~~or 33~~, further including means for extracting one or more coded bits from watermarked sample data, said virtual parameters created dependent upon a watermarked coded bit sequence.

35. The computer program product according to claim 34, further including means for hiding said watermarked coded bit sequence in said articulation parameters.

5 36. The computer program product according to claim 35, further including means for embedding said watermarked coded bit sequence in said virtual parameters.

37. The computer program product according to claim 35 ~~or 36~~, further including means for encrypting said digital watermarked coded bit sequence.

38. The computer program product according to claim 32 ~~or 33~~, further including means for encrypting said digital watermark.

15 39. The computer program product according to ^{claim 29} ~~any one of claims 29 to 38~~, further including means for generating said digital watermark.

40. The computer program product according to ^{claim 29} ~~any one of claims 29 to 39~~, further including means for dividing said digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

41. The computer program product according to ^{claim 29} ~~any one of claims 29 to 40~~, further including means for embedding a playback-control signal.

25 42. The computer program product according to ^{claim 29} ~~any one of claims 29 to 41~~, wherein said digital audio data coded using a synthesiser-architecture format is wavetable (WT) audio.

43. A method of extracting a digital watermark from watermarked digital audio data coded using a synthesiser-architecture format, said method including the steps of:

detecting a watermark from articulation parameters of said watermarked digital audio data coded using a synthesiser-architecture format;

detecting a watermark from sample data of said watermarked digital audio data coded using a synthesiser-architecture format; and

verifying said watermark by comparing said detected watermarks.

44. The method according to claim 43, further including the step of replacing the watermark from said sample data with a corresponding watermark embedded in said articulation parameters if said watermark from said sample data is not available or has been modified.

45. The method according to claim 43 ~~or 44~~, wherein said watermark from sample data includes an adaptively coded bit sequence.

46. The method according to claim 45, further including the step of decrypting said adaptively coded bit sequence.

47. The method according to claim 43 ~~or 46~~, further including the step of decrypting said digital watermark.

48. The method according to ^{claim 43} ~~any one of claims 43 to 47~~, further including the step of dividing said watermarked digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

49. The method according to ^{claim 43} ~~any one of claims 43 to 48~~, further including the step of extracting a playback-control signal.

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50. The method according to ~~any one of claims 43 to 49~~, wherein said digital audio data coded using a synthesiser-architecture is wavetable (WT) audio.

51. An apparatus for extracting a digital watermark from watermarked digital audio data coded using a synthesiser-architecture format, said apparatus including:

means for detecting a watermark from articulation parameters of said watermarked digital audio data coded using a synthesiser-architecture format;

means for detecting a watermark from sample data of said watermarked digital audio data coded using a synthesiser-architecture format; and

means for verifying said watermark by comparing said detected watermarks.

52. The apparatus according to claim 51, further including means for replacing the watermark from said sample data with a corresponding watermark embedded in said articulation parameters if said watermark from said sample data is not available or has been modified.

53. The apparatus according to claim 51 ~~or 52~~, wherein said watermark from sample data includes an adaptively coded bit sequence.

54. The apparatus according to claim 53, further including means for decrypting said adaptively coded bit sequence.

55. The apparatus according to claim 51 ~~or 54~~, further including means for decrypting said digital watermark.

56. The apparatus according to ~~any one of claims 51 to 55~~, further including means for dividing said watermarked digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

57. The apparatus according to ~~any one of claims 51 to 56~~, further including means for extracting a playback-control signal.

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58. The apparatus according to ^{claim 51} ~~any one of claims 51 to 57~~, wherein said digital audio data coded using a synthesiser-architecture format is wavetable (WT) audio.

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59. A computer program product for extracting a digital watermark from watermarked digital audio data coded using a synthesiser-architecture format, said computer program product including:

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means for detecting a watermark from articulation parameters of said watermarked digital audio data coded using a synthesiser-architecture format;

means for detecting a watermark from sample data of said watermarked digital audio data coded using a synthesiser-architecture format; and

means for verifying said watermark by comparing said detected watermarks.

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60. The computer program product according to claim 59, further including means for replacing the watermark from said sample data with a corresponding watermark embedded in said articulation parameters if said watermark from said sample data is not available or has been modified.

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61. The computer program product according to claim 59 ~~or 60~~, wherein said watermark from sample data includes an adaptively coded bit sequence.

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62. The computer program product according to claim 61, further including means for decrypting said adaptively coded bit sequence.

63. The computer program product according to claim 59 ~~or 62~~, further including means for decrypting said digital watermark.

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64. The computer program product according to ^{claim 59} ~~any one of claims 59 to 63~~, further including means for dividing said watermarked digital audio data coded using a synthesiser-architecture format into said sample data and said articulation parameters.

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65. The computer program product according to ^{claim 59} ~~any one of claims 59 to 64~~, further including means for extracting a playback-control signal.

5 66. The computer program product according to ^{claim 59} ~~any one of claims 59 to 65~~, wherein said digital audio data coded using a synthesiser-architecture is wavetable (WT) audio.

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10 67. A system for watermarking a wavetable (WT) audio file, said system including:
means for embedding watermark data into a WT file; and
means for extracting said watermark data from said embedded WT file.

15 68. A method of playing a watermarked wavetable (WT) audio file having a control signal embedded therein to control the number of playbacks, said method including the steps of:
automatically checking the watermarked WT file for said control signal to ensure authentication;
if said control signal indicates at least one playback remains, playing said
20 watermarked WT file; and
decrementing said control signal.